What is claimed is:

1. An arrayed waveguide grating comprising:

one or more input waveguides;

an input side slab-waveguide connected to the output side of the input waveguide or waveguides;

a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides;

an output side slab-waveguide connected to the other terminal of the arrayed waveguides;

a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides; and

at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides;

the afore-said components being all formed on a substrate and the second output waveguide outputting an optical spectrum different from the optical spectral outputted from the other output waveguides.

2. An arrayed waveguide grating comprising:

one or more input waveguides;

an input side slab-waveguide connected to the output side of the input waveguide or waveguides;

a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides;

an output side slab-waveguide connected to the other terminal of the arrayed waveguides;

a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides; and

at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides;

the afore-said components being all formed on a substrate and a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide.

3. The arrayed waveguide grating according to one of claims 1 and 2, wherein the second output waveguide constituting the output waveguides is a monitor light waveguide for wavelength monitoring.

4. The arrayed waveguide grating according to claim 1, wherein the second output waveguide constituting the output waveguides outputs an output spectrum having a narrower spectral width than the spectral width of the output optical spectra of the first output waveguides.

5. The arrayed waveguide grating according to claim 1, wherein the second output waveguide constituting the

output waveguides outputs an optical spectrum having a sharper peak than the peak of the optical spectra of the first output waveguides.

6. The arrayed waveguide grating according to claim 2, wherein the second output waveguide is a monitor light output waveguide and has a tapering connecting portion connected to the output side slab-waveguide.

7. The arrayed waveguide grating according to claim 2, wherein the second output waveguide is a monitor light output waveguide and has a straight connecting portion with a fixed width direction dimension and connected to the output side slab-waveguide, and the first output waveguides constituting the output waveguides have terminal portions with progressively increasing width direction dimensions as one approaches the output side slab-waveguide.

8. The arrayed waveguide grating according to claim 2, wherein the waveguides constituting the output waveguides have terminal portions with progressively increasing width direction dimensions as one approaches the output side slab-waveguide, the terminal portions of the first output waveguides having width direction dimensions increasing at an increased rate.

9. An arrayed waveguide grating module comprising:

an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the optical spectrum outputted from the second output waveguide being different from the optical spectra outputted from the other output waveguides; and

optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating.

10. An arrayed waveguide grating module comprising:

an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to

the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the shape of the connecting portion of the second output waveguide with respect to the output side slab-waveguide being different from the shape of the connecting portion of the second output waveguides with respect to the output side slab-waveguide; and

optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating.

11. A wavelength compensation method in an arrayed waveguide grating module comprising:

a monitor light inputting step of inputting a monitor light for check from either one of the input waveguides with respect to an arrayed waveguide grating module with an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the

other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the optical spectrum outputted from the second output waveguide being different from the optical spectra outputted from the other output waveguides; and

a wavelength compensation step of performing wavelength compensation with respect to the lights outputted from the first waveguides at the time of the light input from the input waveguides by detecting the monitor light outputted from the second output waveguide on the basis of the monitor light inputting step.

12. A wavelength compensation method in an arrayed waveguide grating module comprising:

a monitor light inputting step of inputting a monitor light for check from either one of the input waveguides with respect to an arrayed waveguide grating module with an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the

other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide; and

a wavelength compensation step of performing wavelength compensation with respect to the lights outputted from the first waveguides at the time of the light input from the input waveguides by detecting the monitor light outputted from the second output waveguide on the basis of the monitor light inputting step.

13. A wavelength compensation method in an arrayed waveguide grating module comprising:

a monitor light inputting step of inputting a monitor light for check from either one of the input waveguides with respect to an arrayed waveguide grating module with an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the

input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the second output waveguide outputting an optical spectrum different from the optical spectral outputted from the other output waveguides;

an adjusting step of adjusting the arrayed waveguide grating module such that the second output waveguide outputs a monitor light having a predetermined wavelength when the monitor light is inputted in the monitor light inputting step; and

a signal processing starting step of starting a signal processing by inputting actually used lights from the input waveguides of the arrayed waveguide grating module adjusted in the adjusting step and using wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.

14. A wavelength compensation method in an arrayed waveguide grating module comprising:

a monitor light inputting step of inputting a monitor light for check from either one of the input waveguides

with respect to an arrayed waveguide grating module with an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide

an adjusting step of adjusting the arrayed waveguide grating module such that the second output waveguide outputs a monitor light having a predetermined wavelength when the monitor light is inputted in the monitor light inputting step; and

a signal processing starting step of starting a signal processing by inputting actually used lights from the input waveguides of the arrayed waveguide grating module adjusted in the adjusting step and using wavelength compensated

lights outputted from the first output waveguides of the arrayed waveguide grating.

15. A wavelength compensation method in an arrayed waveguide grating module according to one of claims 13 and 14, wherein in the adjusting step the arrayed waveguide grating module is adjusted by controlling the temperature of the arrayed waveguide grating by using a temperature control circuit assembled in the arrayed waveguide grating module such that the second output waveguide outputs a monitor light having a predetermined wavelength.

16. An optical communication system comprising:

an arrayed waveguide grating module including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the optical spectrum outputted from the second output waveguide being different from the

optical spectra outputted from the other output waveguides, optical fibers each having one terminal optically connected to at least part of the output side of each of a plurality of waveguides constituting the output waveguides of the arrayed waveguide grating, and a temperature control circuit for controlling at least temperature of the channel waveguide of the arrayed waveguide grating;

a monitor light inputting means, to which a monitor light for check is inputted from either one of the input waveguides at the time of checking the arrayed waveguide grating module;

an adjusting step of adjusting the arrayed waveguide grating module such that the second output waveguide outputs a monitor light having a predetermined wavelength when the monitor light is inputted in the monitor light inputting means; and

a signal processing starting means of starting a signal processing by inputting actually used lights from the input waveguides of the arrayed waveguide grating module adjusted in the adjusting means and using wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.

17. An optical communication system comprising:

an arrayed waveguide grating module including one or more

input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides,

a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide, optical fibers each having one terminal optically connected to at least part of the output side of each of a plurality of waveguides constituting the output waveguides of the arrayed waveguide grating, and a temperature control circuit for controlling at least temperature of the channel waveguide of the arrayed waveguide grating;

a monitor light inputting means, to which a monitor light for check is inputted from either one of the input waveguides at the time of checking the arrayed waveguide grating module;

an adjusting step of adjusting the arrayed waveguide grating module such that the second output waveguide outputs a monitor light having a predetermined wavelength when the

monitor light is inputted in the monitor light inputting means; and

a signal processing starting means of starting a signal processing by inputting actually used lights from the input waveguides of the arrayed waveguide grating module adjusted in the adjusting means and using wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.

18. An optical communication system comprising:

an optical transmitting means for transmitting lights having individual wavelengths as parallel signals;

a multiplexer constituted by an arrayed waveguide grating for multiplexing the optical signals with the individual wavelengths transmitted from the optical transmitting means;

a light transmitting line, along which the multiplexed light outputted from the multiplexer is transmitted;

a node having the array waveguide grating appropriately arranged in the light transmitting line;

a demultiplexer for demultiplexing the light transmitted from the light transmitting line via the node in order to separate the lights of respective wavelengths;

an optical receiving means for receiving the demultiplexed light with the individual wavelengths outputted from the demultiplexer;

the demultiplexer being an arrayed waveguide grating

including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the light inputted to the second output waveguide having a spectrum shape different from the spectrum shape of the lights inputted to the first output waveguides.

19. An optical communication system comprising:

an optical transmitting means for transmitting lights having individual wavelengths as parallel signals;

a multiplexer constituted by an arrayed waveguide grating for multiplexing the optical signals with the individual wavelengths transmitted from the optical transmitting means;

a light transmitting line, along which the multiplexed light outputted from the multiplexer is transmitted;

a node having the array waveguide grating

appropriately arranged in the light transmitting line;

a demultiplexer for demultiplexing the light transmitted from the light transmitting line via the node in order to separate the lights of respective wavelengths;

an optical receiving means for receiving the demultiplexed light with the individual wavelengths outputted from the demultiplexer;

the demultiplexer being an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide.

20. An optical communication system comprising:

a first arrayed waveguide grating including a transmission line loop having a plurality of nodes connected one after another in the form of a loop by respective transmission lines, the nodes each demultiplexing a multiplexed light to separate a light having a corresponding wavelength, and a second arrayed waveguide grating multiplexing the separated lights of the individual wavelengths;

the first arrayed waveguide grating being

an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the second output waveguide outputting an optical spectrum different from the optical spectral outputted from the other output waveguides.

21. An optical communication system comprising:

a first arrayed waveguide grating including a

transmission line loop having a plurality of nodes connected one after another in the form of a loop by respective transmission lines, the nodes each demultiplexing a multiplexed light signal to separate a light signal having a corresponding wavelength, and a second arrayed waveguide grating multiplexing the separated light signals of the individual wavelengths;

the first arrayed waveguide grating being an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide.

22. The optical communication system according to

one of claims 18 to 21, wherein a wavelength meter for wavelength monitoring in presetting the wavelength of at least one monitor light inputted to the at least one input waveguide of the first arrayed waveguide grating to a predetermined value when the monitor is inputted, is connected to the second output waveguide.

23. The optical communication system according to one of claims 18 to 21, comprising:

a wavelength meter for being connected to the second output waveguide when a monitor light is inputted to the at least one input waveguide of the first arrayed waveguide grating;

an adjusting means for adjusting the arrayed waveguide grating module such that the monitor light measured in the wavelength meter has a predetermined wavelength; and

a signal processing starting means for starting a signal processing by causing the input of the actually used lights from the input waveguides of the arrayed waveguide grating module adjusted by the adjusting means and using the wavelength compensated lights outputted from the output waveguides of the arrayed waveguide grating.

24. An optical communication system comprising:

an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides,

a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on a substrate and the optical spectrum outputted from the second output waveguide being different from the optical spectra outputted from the other output waveguides, and optical fibers each having one terminal optically connected to at least part of each of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating; and

a module compensating means including a Mach zender circuit, in which a free spectral range as a interval corresponding to one cycle period of loss wavelength characteristic is preset as a desired optical frequency range, and to which the monitor light outputted from the second output waveguide is inputted when the monitor light is inputted to the at least one input waveguide of the first waveguide grating array, a first and a second photo-diodes for receiving respective beams branched out from the output side of the Mach zender circuit, a computing means for taking the ratio between the sum of the output currents from the

two photo-diodes and the output current from either one of the two diodes, a deviation detecting means for detecting a wavelength deviation from the computed ratio, an adjusting means for adjusting the arrayed waveguide grating module by using the detection output from the deviation detecting means such that the monitor lights have a predetermined wavelength, and a signal processing starting means for starting a signal processing by causing input of the actually used lights from the input waveguides of the arrayed waveguide grating module adjusted by the adjusting means and using the wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.

25. An optical communication system comprising:

an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a plurality of arrayed waveguides formed on the side of the input side slab-waveguide opposite the input waveguide or waveguides, an output side slab-waveguide connected to the other terminal of the arrayed waveguides, a plurality of first output waveguides connected to the output side slab-waveguide on the side thereof opposite the arrayed waveguides and at least one second output waveguide formed together with the first output waveguides on the side of the output side slab-waveguide opposite the arrayed waveguides, the afore-said components being all formed on

a substrate and a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide, and optical fibers each having one terminal optically connected to at least part of each of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating; and

a module compensating means including a Mach zender circuit, in which a free spectral range as a interval corresponding to one cycle period of loss wavelength characteristic is preset as a desired optical frequency range, and to which the monitor light outputted from the second output waveguide is inputted when the monitor light is inputted to the at least one input waveguide of the first waveguide grating array, a first and a second photo-diode for receiving respective beams branched out from the output side of the Mach zender circuit, a computing means for taking the ratio between the sum of the output currents from the two photo-diodes and the output current from either one of the two diodes, a deviation detecting means for detecting a wavelength deviation from the computed ratio, an adjusting means for adjusting the arrayed waveguide grating module by using the detection output from the deviation detecting means such that the monitor lights have a predetermined wavelength, and a signal processing starting means for starting a signal processing by causing input of the actually used light signals from the input waveguides of

the arrayed waveguide grating module adjusted by the adjusting means and using the wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.

26. An arrayed waveguide grating comprising:

at least one input waveguides;

an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides;

a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide;

an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array; and

a plurality of waveguides as output waveguides each having one terminal connected to the output side of the output side slab-waveguide, the optical spectrum of the light outputted from a second waveguide as one of the output waveguides being different from the optical spectrum of the lights outputted from first waveguides as the remaining output waveguides.

27. An arrayed waveguide grating comprising:

at least one input waveguides;

an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides;

a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide;

an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array; and

a plurality of waveguides as output waveguides each having one terminal connected to the output side of the output side slab-waveguide, a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide.

28. The arrayed waveguide grating according to one of claims 26 and 27, wherein the second output waveguide constituting the output waveguides is a monitor light waveguide for wavelength monitoring.

29. The arrayed waveguide grating according to claim 26, wherein the second output waveguide constituting the output waveguides outputs an output spectrum having a narrower spectral width than the spectral width of the

output optical spectra of the first output waveguides.

30. The arrayed waveguide grating according to claim 26, wherein the second output waveguide constituting the output waveguides outputs an optical spectrum having a sharper peak than the peak of the optical spectra of the first output waveguides.

31. The arrayed waveguide grating according to claim 27, wherein the second output waveguide is a monitor light output waveguide and has a tapering connecting portion connected to the output side slab-waveguide.

32. The arrayed waveguide grating according to claim 27, wherein the second output waveguide is a monitor light output waveguide and has a straight connecting portion with a fixed width direction dimension and connected to the output side slab-waveguide, and the first output waveguides constituting the output waveguides have terminal portions with progressively increasing width direction dimensions as one approaches the output side slab-waveguide.

33. The arrayed waveguide grating according to claim 27, wherein the waveguides constituting the output waveguides have terminal portions with progressively increasing width direction dimensions as one approaches the output side slab-waveguide, the terminal portions of the first output waveguides having width direction

dimensions increasing at an increased rat .

34. An arrayed waveguide grating module comprising:

an arrayed waveguide grating including at least one input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, the optical spectrum of the light outputted from a second waveguide as one of the output waveguides being different from the optical spectrum of the lights outputted from first waveguides as the remaining output waveguides; and

optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating.

35. An arrayed waveguide grating module comprising:

an arrayed waveguide grating including at least

one input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal; connected to the output side of the output side slab-waveguide, a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide; and

optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating.

36. A wavelength compensation method in an arrayed grating module having an arrayed waveguide grating which includes one or more input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides

with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, the optical spectrum of the light from a second waveguide, i.e., a monitor light waveguide, as one of the output waveguides connected to the input side of the output side slab-waveguide being different from the optical spectrum of the lights from first waveguides as the remaining output waveguides,

the wavelength compensation method comprising a monitor light inputting step of inputting a monitor light for checking from either one of the input waveguides; and a wavelength compensation step of performing wavelength compensation with respect to the lights outputted from the first waveguides at the time of the light input from the input waveguides by detecting the monitor light outputted from the monitor waveguide on the basis of the monitor light inputting step.

37. A wavelength compensation method in an arrayed grating module having an arrayed waveguide grating which includes one or more input waveguides, an input side slab-waveguide with the input side thereof connected to

the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, a connecting portion of the second output waveguide, i.e., a monitor light waveguide, with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide,

the wavelength compensation method comprising a monitor light inputting step of inputting a monitor light for checking from either one of the input waveguides; and a wavelength compensation step of performing wavelength compensation with respect to the lights outputted from the first waveguides at the time of the light input from the input waveguides by detecting the monitor light outputted from the monitor output waveguide on the basis of the monitor light inputting step.

38. A wavelength compensation method in an arrayed grating module having an arrayed waveguide grating which includes one or more input waveguides, an input side

slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, the optical spectrum of the light from a second waveguide, i.e., a monitor light waveguide, as one of the output waveguides connected to the input side of the output side slab-waveguide being different from the optical spectrum of the lights from first waveguides as the remaining output waveguides

the wavelength compensation method comprising:

a monitor light inputting step of inputting a monitor light for checking from either one of the input waveguides,

an adjusting step of adjusting the arrayed waveguide grating module such that the monitor light waveguide outputs a monitor light having a predetermined wavelength when the monitor light is inputted in the monitor light inputting step; and

a wavelength compensation step of performing wavelength compensation with respect to the lights outputted from the first waveguides at the time of the light

input from the input waveguides by detecting the monitor light outputted from the monitor output waveguide on the basis of the monitor light inputting step.

39. A wavelength compensation method in an arrayed grating module having an arrayed waveguide grating which includes one or more input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, a connecting portion of the second output waveguide, i.e., a monitor light waveguide, with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide,

the wavelength compensation method comprising:

a monitor light inputting step of inputting a monitor light for checking from either one of the input waveguides;

an adjusting step of adjusting the arrayed waveguide grating module such that the monitor light waveguide outputs

a monitor light having a predetermined wavelength when the monitor light is inputted in the monitor light inputting step; and

a wavelength compensation step of performing wavelength compensation with respect to the lights outputted from the first waveguides at the time of the light input from the input waveguides by detecting the monitor light outputted from the monitor output waveguide on the basis of the monitor light inputting step.

40. The wavelength compensation method in an arrayed waveguide grating module according to one of claims 13 or 39, wherein in the adjusting step the arrayed waveguide grating module is adjusted by using a temperature control circuit assembled in the arrayed waveguide grating module such that the monitor light waveguide outputs a monitor light having a predetermined wavelength.

41. An optical communication system comprising:

an arrayed waveguide grating module including at least one input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the

input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal; connected to the output side of the output side slab-waveguide, the optical spectrum of the light outputted from a second waveguide, i.e., a monitor light waveguide, as one of the output waveguides being different from the optical spectrum of the lights outputted from the remaining output waveguides, optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating, and a temperature control circuit for adjusting at least the temperature of the channel waveguide array of the arrayed waveguide grating;

a monitor light inputting means for inputting a monitor light for checking from either one of the input waveguides at the time of the arrayed waveguide grating check;

an adjusting means of adjusting the arrayed waveguide grating module such that the monitor waveguide outputs a monitor light having a predetermined wavelength when the monitor light is inputted in the monitor light inputting step; and

a signal processing starting means of starting a signal processing by inputting actually used lights from the input waveguides of the arrayed waveguide grating module adjusted in the adjusting means and using wavelength compensated lights outputted from the first output

waveguides of the arrayed waveguide grating.

42. An optical communication system comprising:

an arrayed waveguide grating module including at least one input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, a connecting portion of the monitor waveguide as the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide, optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating, and a temperature control circuit for adjusting at least the temperature of the channel waveguide array of the arrayed waveguide grating;

a monitor light inputting means for inputting a

monitor light for checking from either one of the input waveguides at the time of the arrayed waveguide grating check;

an adjusting means of adjusting the arrayed waveguide grating module such that the monitor waveguide outputs a monitor light having a predetermined wavelength when the monitor light is inputted in the monitor light inputting step; and

a signal processing starting means of starting a signal processing by inputting actually used lights from the input waveguides of the arrayed waveguide grating module adjusted in the adjusting means and using wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.

43. An optical communication system comprising:

an optical transmitting means for transmitting light signals having individual wavelengths as parallel signals;

a multiplexer constituted by an arrayed waveguide grating for multiplexing the optical signals with the individual wavelengths transmitted from the optical transmitting means;

a light transmitting line, along which the multiplexed light outputted from the multiplexer is transmitted;

a node having the array waveguide grating appropriately arranged in the light transmitting line;

a demultiplexer for demultiplexing the light

transmitted from the light transmitting line via the node in order to separate the lights of respective wavelengths;

an optical receiving means for receiving the demultiplexed light signal with the individual wavelengths outputted from the demultiplexer;

the demultiplexer being an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array, and a plurality of waveguides as output waveguides each having one terminal connected to the output side of the output side slab-waveguide, the optical spectrum of the light outputted from a second waveguide as one of the output waveguides being different from the optical spectrum of the lights outputted from first waveguides as the remaining output waveguides.

44. An optical communication system comprising:

an optical transmitting means for transmitting light signals having individual wavelengths as parallel signals;

a multiplexer constituted by an arrayed waveguide

grating for multiplexing the optical lights with the individual wavelengths transmitted from the optical transmitting means;

a light transmitting line, along which the multiplexed light outputted from the multiplexer is transmitted;

a node having the array waveguide grating appropriately arranged in the light transmitting line;

a demultiplexer for demultiplexing the light transmitted from the light transmitting line via the node in order to separate the lights of respective wavelengths;

an optical receiving means for receiving the demultiplexed light with the individual wavelengths outputted from the demultiplexer;

the demultiplexer being an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array, and a plurality of waveguides as output waveguides each having one terminal connected to the output side of the output side slab-waveguide, a connecting portion of

the second output waveguide with respect to th output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide.

45. An optical communication system comprising:

a first arrayed waveguide grating including a transmission line loop having a plurality of nodes connected one after another in the form of a loop by respective transmission lines, the nodes each demultiplexing a multiplexed light to separate a light having a corresponding wavelength, and a second arrayed waveguide grating multiplexing the separated lights of the individual wavelengths;

the first arrayed waveguide grating being an element including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array, and a plurality of waveguides as output waveguides each having one terminal connected to the output side of the output side slab-waveguide, the optical spectrum of

the light outputted from a second waveguide as on of the output waveguides being different from the optical spectrum of the lights outputted from first waveguides as the remaining output waveguides.

46. An optical communication system comprising:

a first arrayed waveguide grating including a transmission line loop having a plurality of nodes connected one after another in the form of a loop by respective transmission lines, the nodes each demultiplexing a multiplexed light signal to separate a light signal having a corresponding wavelength, and a second arrayed waveguide grating multiplexing the separated light signals of the individual wavelengths;

the first arrayed waveguide grating being an element including one or more input waveguides, an input side slab-waveguide connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of vthe input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array, and a plurality of waveguides as output waveguides each having one terminal connected to the output side of the output side slab-waveguide, a connecting portion of

the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide.

47. The optical communication system according to one of claims 43 to 46, wherein a wavelength meter for wavelength monitoring in presetting the wavelength of at least one monitor light inputted to the at least one input waveguide of the first arrayed waveguide grating to a predetermined value when the monitor is inputted, is connected to the second output waveguide.

48. The optical communication system according to one of claims 43 to 46, comprising:

a wavelength meter for being connected to the second output waveguide when a monitor light is inputted to the at least one input waveguide of the first arrayed waveguide grating;

an adjusting means for adjusting the arrayed waveguide grating module such that the monitor light measured in the wavelength meter has a predetermined wavelength; and

a signal processing starting means for starting a signal processing by causing the input of the actually used light signals from the input waveguides of the arrayed waveguide grating module adjusted by the adjusting means and using the wavelength compensated lights outputted from

the output waveguides of the arrayed waveguide grating.

49. An optical communication system comprising;

an arrayed waveguide grating module including at least one input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of waveguides with lengths progressively increasing by a predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, the optical spectrum of the light outputted from a second waveguide as one of the output waveguides being different from the optical spectrum of the lights outputted from first waveguides as the remaining output waveguides, and optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating; and

a module compensating means including a Mach zender circuit, in which a free spectral range as a interval corresponding to one cycle period of loss wavelength characteristic is preset as a desired optical frequency

range, and to which the monitor light outputted from the second output waveguide is inputted when the monitor light is inputted to the at least one input waveguide of the first waveguide grating array, a first and a second photo-diodes for receiving respective beams branched out from the output side of the Mach zender circuit, a computing means for taking the ratio between the sum of the output currents from the two photo-diodes and the output current from either one of the two diodes, a deviation detecting means for detecting a wavelength deviation from the computed ratio, an adjusting means for adjusting the arrayed waveguide grating module by using the detection output from the deviation detecting means such that the monitor lights have a predetermined wavelength, and a signal processing starting means for starting a signal processing by causing input of the actually used light signals from the input waveguides of the arrayed waveguide grating module adjusted by the adjusting means and using the wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.

50. An optical communication system comprising:

an arrayed waveguide grating module having an arrayed waveguide grating including one or more input waveguides, an input side slab-waveguide with the input side thereof connected to the output side of the input waveguide or waveguides, a channel waveguide array including a plurality of wav guides with lengths progressively increasing by a

predetermined waveguide length difference, the input side of the waveguides being connected to the output side of the input side slab-waveguide, an output side slab-waveguide with the input side thereof connected to the output side of the plurality of waveguides constituting the channel waveguide array and a plurality of output waveguides each having one terminal connected to the output side of the output side slab-waveguide, a connecting portion of the second output waveguide with respect to the output side slab-waveguide having a shape different from the shape of connecting portions of the first output waveguides with respect to the output side slab-waveguide, and optical fibers each having one terminal optically connected to at least part of the plurality of waveguides constituting the output waveguides of the arrayed waveguide grating;

a module compensating means including a Mach zender circuit, in which a free spectral range as a interval corresponding to one cycle period of loss wavelength characteristic is preset as a desired optical frequency range, and to which the monitor light outputted from the second output waveguide is inputted when the monitor light is inputted to the at least one input waveguide of the first waveguide grating array, a first and a second photo-diodes for receiving respective beams branched out from the output side of the Mach zender circuit, a computing means for taking the ratio between the sum of the output currents from the two photo-diodes and the output current from either one of the two diodes, a deviation detecting means for detecting

a wavelength deviation from the computed ratio, an adjusting means for adjusting the arrayed waveguide grating module by using the detection output from the deviation detecting means such that the monitor lights have a predetermined wavelength, and a signal processing starting means for starting a signal processing by causing input of the actually used lights from the input waveguides of the arrayed waveguide grating module adjusted by the adjusting means and using the wavelength compensated lights outputted from the first output waveguides of the arrayed waveguide grating.